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Deliver to: Phuong M. Phu, USPTO
Art Group: 2611
Facsimile No.: (571) 273-8300
Date: July 14, 2008
From: Brent E. Vecchia, Reg. No. 48,011
Our Docket No.: 42P17667
Number of pages 34 including this sheet.
Application No.: 10/749,987
Filing Date: 12/31/2003
Docket Due Date(s): 7/12/2008

Enclosed are the following documents:

- ☐ Amendment: (pgs)
- ☒ Appeal Brief (30 pgs)
- ☐ Application: (pgs) w/cover & abstract)
- ☐ Assignment & Cover Sheet (pgs)
- ☒ Certificate of Facsimile
- ☐ Continued Prosecution Application (CPA)
- ☐ Declaration & POA (pgs)
- ☐ Drawings: sheets, figures
- ☐ Extension of Time:
- ☒ Fee Transmittal (in duplicate)
- ☐ IDS & PTO/SB/08 (pgs)
- ☐ Other:
- ☐ Issue Fee Transmittal
- ☐ Notice of Appeal (in duplicate)
- ☐ Petition for:
- ☐ Request for Continued Examination (RCE) (in duplicate)
- ☐ Reply Brief (pgs)
- ☐ Request & Certification Under 35 USC 122(b)(2)(B)(i)
- ☐ Request to Rescind Previous Nonpublication Request
- ☐ Response to Notice of Missing Parts & Formalities Letter
- ☐ Response to Written Opinion (pgs)
- ☐ Terminal Disclaimer
- ☐ Transmittal of Publication Fee Due
- ☒ Transmittal Letter

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Brent E. Vecchia — 7/14/2008
Brent E. Vecchia — *Date*

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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application No.	10/749,987
Filing Date	December 31, 2003
First Named Inventor	Neil J. Bershad
Art Unit	2611
Examiner Name	Phuong M. Phu
Total Number of Pages in This Submission	34
Attorney Docket Number	42P17667

ENCLOSURES *(check all that apply)*

- [X] Fee Transmittal Form
  - [ ] Fee Attached
- [ ] Amendment / Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
  - [ ] PTO/SB/08
- [ ] Certified Copy of Priority Document(s)
- [ ] Response to Missing Parts/ Incomplete Application
  - [ ] Basic Filing Fee
  - [ ] Declaration/POA
  - [ ] Response to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
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- [ ] CD, Number of CD(s)
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [X] Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
- [ ] Proprietary Information
- [ ] Status Letter
- [X] Other Enclosure(s) *(please identify below):*

Facsimile Cover Sheet

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Brent E. Vecchia, Reg. No. 48,011 BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP
Signature	Brent E. Vecchia
Date	July 14, 2008

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FEE TRANSMITTAL for FY 2007

Patent fees are subject to annual revision

☐ Applicant claims small entity status. See 37 CFR 1.27.

TOTAL AMOUNT OF PAYMENT ($) 510.00

Complete if Known	
Application Number	10/749,987
Filing Date	December 31, 2003
First Named Inventor	Neil J. Bershad
Examiner Name	Phuong M. Phu
Art Unit	2611
Attorney Docket No.	42P17667

METHOD OF PAYMENT *(check all that apply)*

☐ Check ☐ Credit card ☐ Money Order ☒ None ☐ Other (please identify): _____

☒ Deposit Account Deposit Account Number: 02-2666 Deposit Account Name: Blakely, Sokoloff, Taylor & Zafman LLP

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

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Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet.	
2053	130	2053	130	Non-English specification	
1251	120	2251	60	Extension for reply within first month	
1252	460	2252	230	Extension for reply within second month	
1253	1,050	2253	525	Extension for reply within third month	
1254	1,640	2254	820	Extension for reply within fourth month	
1255	2,230	2255	1,115	Extension for reply within fifth month	
1401	510	2401	255	Notice of Appeal	
1402	510	2402	255	Filing a brief in support of an appeal	510.00
1403	1,030	2403	515	Request for oral hearing	
1451	1,510	2451	1,510	Petition to institute a public use proceeding	
1460	130	2460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
1809	810	1809	405	Filing a submission after final rejection (37 CFR § 1.129(a))	
1810	810	2810	405	For each additional invention to be examined (37 CFR § 1.129(b))	

Other fee (specify)

SUBTOTAL (2) ($) 510.00

SUBMITTED BY Complete (if applicable)

Name (Print/Type)	Brent E. Vecchia	Registration No. (Attorney/Agent)	48,011	Telephone	(303) 740-1980
Signature	Brent E. Vecchia			Date	07/14/08

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TOTAL AMOUNT OF PAYMENT ($) 510.00

Complete if Known	
Application Number	10/749,987
Filing Date	December 31, 2003
First Named Inventor	Neil J. Bershad
Examiner Name	Phuong M. Phu
Art Unit	2611
Attorney Docket No.	42P17667

METHOD OF PAYMENT *(check all that apply)*

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☒ Deposit Account Deposit Account Number: 02-2666 Deposit Account Name: Blakely, Sokoloff, Taylor & Zafman LLP

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FEE CALCULATION

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
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1810	810	2810	405	For each additional invention to be examined (37 CFR § 1.129(b))	

Other fee (specify)

SUBTOTAL (2) ($) 510.00

SUBMITTED BY Complete (if applicable)

Name (Print/Type)	Brent E. Vecchia	Registration No. (Attorney/Agent)	48,011	Telephone	(303) 740-1980
Signature	Brent E. Vecchia			Date	07/14/08

Based on PTO/SB/17 (12-04) as modified by Blakely, Sokoloff, Taylor & Zafman (wlr) 12/15/2004.
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Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application. No.	: 10/749,987	Confirmation No.	: 9976
1st Named Inventor	: Neil J. Bershad	Art Unit	: 2609
Filed	: 12/31/2003	Examiner	: Pablo R. Ovando
Docket No.	: 42P17667	Customer No.	: 7590

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF
IN SUPPORT OF APPELLANT'S APPEAL
TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Sir:

This brief is in furtherance of the Notice of Appeal, filed in the above-captioned case on 5/12/08. Applicants (hereafter "Appellants") hereby submit this Brief (37 C.F.R. § 41.37). The fees required under § 41.20(b)(2), and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying Transmittal of Appeal Brief. Appellants respectfully request consideration of this appeal by the Board of Patent Appeals and Interferences for allowance of the above-captioned patent application.

An oral hearing is not desired.

TABLE OF CONTENTS

This brief contains these items under the following headings, and in the order set forth below (37 C.F.R. § 41.37c(1)):

Page 23 of this brief bears the practitioner's signature.

I. REAL PARTY IN INTEREST (37 C.F.R. § 41.37(c)(1)(i))

The real party in interest in this appeal is Intel Corporation of 2200 Mission College Boulevard, Santa Clara, California, 95052, to whom the invention is assigned.

II. RELATED APPEALS AND INTERFERENCES (37 C.F.R. § 41.37(c)(1)(ii))

With respect to other appeals or interferences that will directly affect, or be affected by, or have a bearing on the Board's decision in this appeal, to the best of Appellant's knowledge, there are no such appeals or interferences.

III. STATUS OF THE CLAIMS (37 C.F.R. § 41.37(c)(1)(iii))

The status of the claims in this application are:

A. TOTAL NUMBER OF CLAIMS IN APPLICATION

Claims 1, 3-9, 11-29 are currently pending in the application.

B. STATUS OF ALL THE CLAIMS

1. Claims cancelled: 2, 10
2. Claims withdrawn from consideration but not cancelled: NONE
3. Claims pending: 1, 3-9, 11-29
4. Claims allowed: None
5. Claims rejected: 1, 3-9, 11-29

C. CLAIMS ON APPEAL

Claims 1, 3-9, 11-29 are on appeal.

IV. STATUS OF AMENDMENTS (37 C.F.R. § 41.37(c)(1)(iv))

A response was submitted on 4/7/08 in response to the Final Office Action mailed on February 2/08/08. The response did not include any amendments to the claims. A copy of all claims on appeal is attached hereto as an appendix of claims.

V. SUMMARY OF CLAIMED SUBJECT MATTER (37 C.F.R. § 41.37(c)(1)(v))

Embodiments of the invention pertain to a dual adaptive filter apparatus and/or method. See e.g., the Title.

Independent claim 1 pertains to a method according to a first embodiment of the invention. See e.g., FIG. 2, paragraphs [0016] through [0024], and original claim 1. The method includes transforming a signal from a time domain to a transform domain with a wavelet transform. See e.g., block 210 in FIG. 2, paragraph [0016], paragraphs [0040]-[0041], and signal transformer 310 in FIG. 3. The method includes adapting a first adaptive filter in the transform domain based on the transformed signal. See e.g., block 220 in FIG. 2, paragraph [0017], paragraph [0021], and first adaptive filter 320 in FIG. 3. The method includes estimating a delay of an impulse response based on the adaptation of the first filter. See e.g., block 230 in FIG. 2, paragraph [0018], paragraph [0021], paragraph [0046], paragraph [0049]-[0050], and delay estimator 340 in FIG. 3. The method includes delaying a signal based on the estimated delay. See e.g., block 240 in FIG. 2, paragraph [0019], and delayer 350 in FIG. 3. The method includes adapting a second adaptive filter in the time domain based on the delayed signal. See e.g., block 250 in FIG. 2, paragraph [0020], paragraph [0021], and second adaptive filter 360 in FIG. 3.

Independent claim 9 pertains to an article according to a first embodiment of the invention. See e.g., paragraph [0072] and original claim 9. The article includes a storage medium having stored thereon data representing sequences of instructions that if executed cause an apparatus to perform a process or set of operations. See e.g., paragraph [0072] and original claim 9. The process includes transform a signal from a time domain to a transform domain with a wavelet transform. See e.g., block 210 in FIG. 2, paragraph [0016], paragraphs [0040]-[0041], and signal transformer 310 in FIG. 3. The process includes adapt a first adaptive filter in the transform domain based on the

transformed signal. See e.g., block 220 in FIG. 2, paragraph [0017], paragraph [0021], and first adaptive filter 320 in FIG. 3. The process includes estimate a delay of an impulse response based on the adaptation of the first filter. See e.g., block 230 in FIG. 2, paragraph [0018], paragraph [0021], paragraph [0046], paragraph [0049]-[0050], and delay estimator 340 in FIG. 3. The process includes adapt a second adaptive filter in the time domain based on a signal that has been delayed based on the estimated delay. See e.g., block 240 in FIG. 2, paragraph [0019], and delayer 350 in FIG. 3. Also see e.g., block 250 in FIG. 2, paragraph [0020], paragraph [0021], and second adaptive filter 360 in FIG. 3.

Independent claim 16 pertains to an apparatus according to a first embodiment of the invention. See e.g., FIG. 3 and original claim 16. The apparatus includes a signal transformer to transform a signal in a time domain to a transformed signal in a transform domain. See e.g., signal transformer 310 in FIG. 3, paragraph [0025], paragraphs [0028]-[0029], block 210 in FIG. 2, paragraph [0016], and paragraphs [0040]-[0041]. The apparatus also includes a first adaptive filter in communication with the signal transformer, the first adaptive filter to adapt based on the transformed signal in the transform domain. See e.g., first adaptive filter 320 in FIG. 3, paragraph [0025], paragraph [0041], block 220 in FIG. 2, paragraph [0017], paragraph [0021]. The apparatus also includes a delay estimator in communication with the first adaptive filter, the delay estimator to estimate a delay associated with an impulse response based on the adaptation of the first adaptive filter. See e.g., delay estimator 340 in FIG. 3, paragraph [0025], paragraphs [0049]-[0050], block 230 in FIG. 2, paragraph [0018], paragraph [0021], and paragraph [0046]. The apparatus also includes a delayer in communication with the delay estimator, the delayer to delay a signal in the time domain based on the estimate of the delay. See e.g., delayer 350 in FIG. 3, paragraph [0025], paragraphs [0056]-[0060], block 240 in FIG. 2, and paragraph [0019]. The apparatus also includes a

second adaptive filter in communication with the delayer, the second adaptive filter to adapt in the time domain based on the delayed signal. See e.g., second adaptive filter 360 in FIG. 3, paragraph [0025], paragraphs [0063]-[0065], block 250 in FIG. 2, paragraph [0020], and paragraph [0021].

Independent claim 26 pertains to an apparatus according to a first embodiment of the invention. See e.g., FIG. 4, FIG. 3, and original claim 26. The apparatus includes a DRAM memory and an echo canceller. See e.g., echo cancellor 300 in FIG. 3, echo cancellor 410 in FIG. 4, and DRAM memory mentioned in paragraph [0068]. The echo cancellor includes a signal transformer to transform a signal in a time domain to a transformed signal in a transform domain. See e.g., signal transformer 310 in FIG. 3, paragraph [0025], paragraphs [0028]-[0029], block 210 in FIG. 2, paragraph [0016], and paragraphs [0040]-[0041]. The echo cancellor also includes a first adaptive filter in communication with the signal transformer, the first adaptive filter to adapt based on the transformed signal in the transform domain. See e.g., first adaptive filter 320 in FIG. 3, paragraph [0025], paragraph [0041], block 220 in FIG. 2, paragraph [0017], paragraph [0021]. The echo cancellor also includes a delay estimator in communication with the first adaptive filter, the delay estimator to estimate a delay associated with an impulse response based on the adaptation of the first adaptive filter. See e.g., delay estimator 340 in FIG. 3, paragraph [0025], paragraphs [0049]-[0050], block 230 in FIG. 2, paragraph [0018], paragraph [0021], and paragraph [0046]. The echo cancellor also includes a a delayer in communication with the delay estimator, the delayer to delay a signal in the time domain based on the estimate of the delay. See e.g., delayer 350 in FIG. 3, paragraph [0025], paragraphs [0056]-[0060], block 240 in FIG. 2, and paragraph [0019]. The echo cancellor also includes a second adaptive filter in communication with the delayer, the second adaptive filter to adapt in the time domain based on the delayed

signal. See e.g., second adaptive filter 360 in FIG. 3, paragraph [0025], paragraphs [0063]-[0065], block 250 in FIG. 2, paragraph [0020], and paragraph [0021].

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL (37 C.F.R. § 41.37(c)(1)(vi))

A. Claims 1, 5-9, and 13-15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0093919 by Bershad et al., in view of U.S. Patent No. 4,951,269 issued to Amano et al., in further view of the article "Wavelet Transform Domain Adaptive FIR Filtering" by Hosur et al.

B. Claims 16, 20-26, and 28-29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0093919 by Bershad et al., in view of U.S. Patent No. 4,951,269 issued to Amano et al.

VII. ARGUMENT (37 C.F.R. § 41.37(c)(1)(vii))

A. Rejection of claims 1, 5-9, and 13-15 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0093919 by Bershad et al. (hereinafter "Bershad"), in view of U.S. Patent No. 4,951,269 issued to Amano et al. (hereinafter "Amano"), in further view of the article "Wavelet Transform Domain Adaptive FIR Filtering" by Hosur et al. (hereinafter "Hosur") is believed to be improper.

GROUP I: CLAIMS 1, 5-9 and 13-15

The Examiner has rejected claims 1, 5-9 and 13-15 under 35 U.S.C. §103(a) as being unpatentable over Bershad in view of Amano in further view of Hosur.

Claim 1 pertains to:

"A method comprising:

transforming a signal from a time domain to a transform domain with a wavelet transform;

adapting a first adaptive filter in the transform domain based on the transformed signal;

estimating a delay of an impulse response based on the adaptation of the first filter;

delaying a signal based on the estimated delay; and

adapting a second adaptive filter in the time domain based on the delayed signal".

Notice that the delay is **estimated based on the adaptation of the first filter**, which was adapted in the **transform** domain. Also, notice that **two filters** (not just one) are adapted. In particular, the first filter is adapted in the **transform** domain, and the second filter is adapted in the **time** domain. Also notice that the second adaptive filter is adapted based on a **delayed** signal that is delayed based on the delay **estimated based on the adaptation of the first filter**.

Firstly, Appellants respectfully submit that Bershad, Amano and Hosur should not be combined as proposed by the Examiner. Secondly, Appellants respectfully submit that Bershad, Amano and Hosur do not disclose all of the limitations of claim 1.

I. Bershad, Amano and Hosur should not be combined as proposed by the Examiner

Bershad discusses fast converging affine projection based echo cancellers for sparse multi-path channels. See e.g., the Title. FIG. 3 of Bershad is a diagram illustrating an AP-based echo canceller. See e.g., paragraph [0011]. FIG. 3 includes an adaptive filter 310 and an adaptive filter 330. FIG. 4A is a diagram illustrating the adaptive filter 310 for the AP-based echo canceller shown in FIG. 3. See e.g., FIG. 4A and paragraph [0012]. FIG. 4B is a diagram illustrating the adaptive filter 330 for the AP-based echo canceller shown in FIG. 3. See e.g., FIG. 4B and paragraph [0013]. Inspection of FIGs. 4A and 4B reveals that these adaptive filters both receive signal u(k). U(k) is the notation used for the time domain. Accordingly, **both the adaptive filter 310 of FIG. 4A and the adaptive filter 330 of FIG. 4B adapt in the time domain.**

Amano discusses an echo canceller with a short processing delay and decreased multiplication number. See e.g., the Title. FIG. 1 is a block diagram showing the general structure of an echo canceller. As shown in FIG. 1 and discussed at column 8, lines 9-52, the echo canceller includes in part a 1st 2N'-points fast Fourier transform (FFT) 11, a finite impulse response (FIR) filter 12, a 2N'-points inverse fast Fourier transform (IFFT), and a delay circuit 18. However, Amano discusses using **one single filter**, namely the FIR filter 12 in FIG. 1. There is no disclosure or suggestion that the single FIR filter 12 could or

should be used in a two-filter approach like that disclosed in Bershad. Furthermore, Amano does not disclose that adaptation of the single FIR filter 12 be used to **estimate a delay** of an impulse response. Rather, Amano discusses that the single FIR filter 12 be used to **estimate the echo signal** that is subtracted from the actual echo signal. Amano does not disclose that adaptation of a filter be used to estimate a **delay**.

The Examiner has asserted that *"it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the teachings of Amano in Bershad for the purpose of 'reducing calculations'"*. See e.g., page 3 of the Final Office Action mailed 02/08/08.

Appellants respectfully disagree. At least four reasons are given below.

Firstly, there is no disclosure that calculations would be reduced if the FIR filter 12 of Amano were used to estimate the delay in a two-filter approach like that disclosed in Bershad as asserted by the Examiner. Amano discloses that the single FIR filter 12 alone is sufficient for the intended purpose of estimating the echo signal. The Examiner has proposed effectively **adding** to the transform and adaptation of the FIR filter 12 of Amano an adaptation of a second filter in the time domain as disclosed in Bershad. However, adding the adaptation of the second filter to Amano would **increase the number of calculations**, instead of decreasing the number of calculations. Accordingly, the Examiner's motiviation for combining Amano with Bershad would seem to be invalid.

The present patent application discloses that certain transforms, such as, for example, **partial** Haar transforms, are computationally efficient and fast at estimating a delay of a sparse impulse response. The present patent application

also discloses that calculations may be reduced and convergence accelerated when such a transform is used and a first filter adapted on the transformed signal to estimate a delay, and also a second filter is adapted based on a signal delayed by the estimated delay.

However, neither Bershad or Amano disclose such partial Haar transforms. The transform and FIR filter 12 adaptation discussed in Amano is reportedly alone sufficient to estimate the echo. The Examiner has not cited a reference demonstrating how to reduce the transform and FIR filter 12 of Amano so that adding an adaptation of a second filter as disclosed in Bershad would result in a total/combined number of calculations that would be less than that for Amano alone. Without such a reduction of the calculations already described in Amano, adding additional calculations for the adaptation of the second filter proposed by the Examiner would increase the number of calculations, not reduce the number of calculations as asserted by the Examiner. Additionally, if the FIR filter 12 discussed in Amano alone is sufficient for the intended purpose of estimating the echo, then adding the additional second filter adaptation as proposed by the Examiner would seem to serve no other purpose other than to increase the number of calculations.

Accordingly, Appellants respectfully submit that the Examiner's stated reasons for combining these references would be invalid. Further, Appellants respectfully submit that the Examiner has not identified a proper reason to add adaptation of a second filter in the time domain to the adaptation of the FIR filter 12 already described in Amano.

Secondly, there is no disclosure or suggestion in either reference that the FIR filter 12 would be useful for estimating the delay of an impulse response in

the two-filter approach of Bershad. The Examiner has not established that delay estimation is a prior art established function of the FIR filter 12 of Amano. Since neither reference establishes that the FIR filter 12 of Amano can be used to estimate a delay, it would not be obvious to substitute it for the time-based filter used in Bershad for estimating delay.

Thirdly, Amano discloses that frequency domain adaptive filtering is superior to time domain adaptive filtering concerning the computations required. See e.g., column 1, lines 11-14. This seems to teach away from the Examiner's proposed modification to use the frequency domain adaptation described in Amano just to estimate a delay that is used by a a time adaptation as discussed in Bershad.

Fourthly, each of Amano and Bershad is complete and functional in itself. Accordingly, there would be no reason to use parts of Amano in Bershad. In addition, modifications not taught in the prior art may be needed in order to make the combination proposed by the Examiner.

Accordingly, for at least one or more of these reasons, Appellants respectfully submit that Amano and Bershad should not be combined as proposed by the Examiner.

Claim 1 also recites that the signal is transformed with a wavelet transform. However, Amano discusses using a fast Fourier transform (FFT). The Examiner has also asserted that it would have been obvious to apply the wavelet transform teachings of Hosur in Bershad. See e.g., page 3 of the Final Office Action mailed 02/08/08.

Appellants respectfully disagree. Firstly, there is no disclosure that calculations would be reduced if wavelet transform domain adaptive FIR filtering of Hosur were used to estimate the delay in a two-filter approach like that disclosed in Bershad. The discussion above is pertinent to this point. In particular, the Examiner has not shown where Hosur discloses using a partial Haar transform to estimate a delay.

Secondly, since the filtering discussed in Hosur alone appears to be sufficient for the intended purpose, adding the additional second filter adaptation as proposed by the Examiner would seem to serve no other purpose other than to increase the number of calculations.

Thirdly, there is no disclosure or suggestion in either reference that the wavelet transform domain adaptive FIR filters discussed in Hosur be useful for **estimating the delay** of an impulse response in the two-filter approach of Bershad. The Examiner has not established that **delay estimation** is a prior art **established function** of the wavelet transform domain adaptive FIR filters of Hosur. Since neither reference establishes that the wavelet transform domain adaptive FIR filters of Hosur be used to estimate a delay, it would not be obvious to substitute it for the time-based filter used in Bershad for estimating delay.

Fourthly, each of Hosur and Bershad is complete and functional in itself. Accordingly, there would be no reason to use parts of Hosur in Bershad. In addition, modifications not taught in the prior art may be needed in order to make the combination proposed by the Examiner.

Accordingly, for at least one or more of these reasons, Hosur should not be combined with Amano and Bershad.

II. Bershad, Amano and Hosur do not disclose all of the limitations of claim 1.

Even if combined, Appellants respectfully submit that Bershad, Amano and Hosur do not disclose all of the limitations of claim 1. In particular, Bershad, Amano and Hosur do not disclose *"adapting a first adaptive filter in the transform domain based on the transformed signal; estimating a delay of an impulse response based on the adaptation of the first filter; delaying a signal based on the estimated delay; and adapting a second adaptive filter in the time domain based on the delayed signal"*. In particular, neither of Bershad, Amano or Hosur disclose **estimating a delay** of an impulse response **based on the adaptation of the first filter** that was adapted in the **transform** domain.

In the Advisory Action, the Examiner has asserted that claim 1 does not recite that the first adaptive filter has the function of estimating the delay. Applicants respectfully disagree. Claim 1 specifically recites *"adapting a first adaptive filter in the transform domain based on the transformed signal"* and *"estimating a delay of an impulse response based on the adaptation of the first filter"*.

Appellants respectfully submit that Hindsight based on statements in the patent application cannot be the reason for combining references. It is not correct merely to focus on the differences between the prior art and the claimed invention, and then to state that the differences themselves are obvious. The claimed invention as a whole is to be considered. Further, it is impermissible to use the patent application as the basis for the obviousness rejection. It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed

invention is rendered obvious. One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

For at least one or more of these reasons, claim 1 and its dependent claims are believed to be allowable over Bershad, Amano and Hosur.

Independent claim 9 and its dependent claims are believed to be allowable over Bershad, Amano and Hosur for one or more similar reasons.

B. Rejection of claims 16, 20-26, and 28-29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Publication No. 2002/0093919 by Bershad et al. (hereinafter "Bershad"), in view of U.S. Patent No. 4,951,269 issued to Amano et al. (hereinafter "Amano") is believed to be improper

GROUP II: CLAIMS 16, 20-26 and 28-29

The Examiner has rejected claims 16, 20-26 and 28-29 under 35 U.S.C. §103(a) as being unpatentable over Bershad in view of Amano.

Claim 16 pertains to:

"An apparatus comprising:

a signal transformer to transform a signal in a time domain to a transformed signal in a transform domain;

a first adaptive filter in communication with the signal transformer, the first adaptive filter to adapt based on the transformed signal in the transform domain;

a delay estimator in communication with the first adaptive filter, the delay estimator to estimate a delay associated with an impulse response based on the adaptation of the first adaptive filter;

a delayer in communication with the delay estimator, the delayer to delay a signal in the time domain based on the estimate of the delay; and

a second adaptive filter in communication with the delayer, the second adaptive filter to adapt in the time domain based on the delayed signal".

Firstly, Appellants respectfully submit that Bershad and Amano should not be combined as proposed by the Examiner. Secondly, Appellants respectfully submit that Bershad and Amano do not disclose all of the limitations of claim 16.

I. Bershad and Amano should not be combined as proposed by the Examiner

The Examiner has asserted that "*it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the teachings of* Amano *in* Bershad *for the purpose of 'reducing calculations'*". See e.g., page 6 of the Final Office Action mailed 02/08/08.

Appellants respectfully disagree. At least four reasons are given below.

Firstly, there is no disclosure that calculations would be reduced if the FIR filter 12 of Amano were used to estimate the delay in a two-filter approach like that disclosed in Bershad as asserted by the Examiner. Amano discloses that the single FIR filter 12 alone is sufficient for the intended purpose of estimating the echo signal. The Examiner has proposed effectively **adding** to the transform and adaptation of the FIR filter 12 of Amano an adaptation of a second filter in the time domain as disclosed in Bershad. However, adding the adaptation of the second filter to Amano would **increase the number of calculations**, instead of decreasing the number of calculations. Accordingly, the Examiner's motiviation for combining Amano with Bershad would seem to be invalid.

The present patent application discloses that certain transforms, such as, for example, **partial** Haar transforms, are computationally efficient and fast at estimating a delay of a sparse impulse response. The present patent application also discloses that calculations may be reduced and convergence accelerated when such a transform is used and a first filter adapted on the transformed signal to estimate a delay, and also a second filter is adapted based on a signal delayed by the estimated delay.

However, neither Bershad or Amano disclose such partial Haar transforms. The transform and FIR filter 12 adaptation discussed in Amano is

reportedly alone sufficient to estimate the echo. The Examiner has not cited a reference demonstrating how to **reduce** the transform and FIR filter 12 of Amano so that adding an adaptation of a second filter as disclosed in Bershad would result in a total/combined number of calculations that would be less than that for Amano alone. Without such a reduction of the calculations already described in Amano, adding additional calculations for the adaptation of the second filter proposed by the Examiner would increase the number of calculations, not reduce the number of calculations as asserted by the Examiner. Additionally, if the FIR filter 12 discussed in Amano alone is **sufficient** for the intended purpose of estimating the echo, then adding the additional second filter adaptation as proposed by the Examiner would seem to serve no other purpose other than to increase the number of calculations.

Accordingly, Appellants respectfully submit that the Examiner's stated reasons for combining these references would be invalid. Further, Appellants respectfully submit that the Examiner has not identified a proper reason to add adaptation of a second filter in the time domain to the adaptation of the FIR filter 12 already described in Amano.

Secondly, there is no disclosure or suggestion in either reference that the FIR filter 12 would be useful for **estimating the delay** of an impulse response in the two-filter approach of Bershad. The Examiner has not established that **delay estimation** is a prior art **established function** of the FIR filter 12 of Amano. Since neither reference establishes that the FIR filter 12 of Amano can be used to estimate a delay, it would not be obvious to substitute it for the time-based filter used in Bershad for estimating delay.

Thirdly, Amano discloses that frequency domain adaptive filtering is superior to time domain adaptive filtering concerning the computations required. See e.g., column 1, lines 11-14. This seems to **teach away** from the Examiner's proposed modification to use the frequency domain adaptation described in Amano just to estimate a delay that is used by a a time adaptation as discussed in Bershad.

Fourthly, each of Amano and Bershad is complete and functional in itself. Accordingly, there would be no reason to use parts of Amano in Bershad. In addition, modifications not taught in the prior art may be needed in order to make the combination proposed by the Examiner.

Accordingly, for at least one or more of these reasons, Appellants respectfully submit that Amano and Bershad should not be combined as proposed by the Examiner.

II. Bershad and Amano do not disclose all of the limitations of claim 16.

Even if combined, Appellants respectfully submit that Bershad and Amano do not disclose all of the limitations of claim 1. In particular, Bershad, Amano and Hosur do not disclose *"a signal transformer to transform a signal in a time domain to a transformed signal in a* ***transform*** *domain;* ***a first adaptive filter*** *in communication with the signal transformer, the first adaptive filter to adapt based on the transformed signal in the* ***transform*** *domain;* ***a delay estimator*** *in communication with the first adaptive filter, the delay estimator to* ***estimate a delay*** *associated with an impulse response* ***based on the adaptation of the first adaptive filter"*** which was adapted in the transform domain. In particular, neither of Bershad or Amano disclose **a delay estimator** to **estimate a delay** associated with an impulse

response **based on the adaptation of the first adaptive filter** that was adapted based on a **transformed** signal.

Appellants respectfully submit that Hindsight based on statements in the patent application cannot be the reason for combining references. It is not correct merely to focus on the differences between the prior art and the claimed invention, and then to state that the differences themselves are obvious. The claimed invention as a whole is to be considered. Further, it is impermissible to use the patent application as the basis for the obviousness rejection. It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

For at least one or more of these reasons, claim 16 and its dependent claims are believed to be allowable over Bershad, Amano and Hosur.

Independent claim 26 and its dependent claims are believed to be allowable over Bershad, Amano and Hosur for one or more similar reasons.

CONCLUSION

Based on the foregoing, Appellants request that the Board overturn the rejection of all pending claims and hold that all of the claims of the present application are allowable.

Appellants respectfully petition for an extension of time to respond to the outstanding Office Action pursuant to 37 C.F.R. § 1.136(a) should one be necessary. Please charge our Deposit Account No. 02-2666 to cover the necessary fee under 37 C.F.R. § 1.17 for such an extension.

Please charge any shortages and credit any overpayment to our Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

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VIII. CLAIMS APPENDIX (37 C.F.R. § 41.37(c)(1)(viii))

The text of the claims involved in the appeal are:

1. (Previously Presented) A method comprising:

transforming a signal from a time domain to a transform domain with a wavelet transform;

adapting a first adaptive filter in the transform domain based on the transformed signal;

estimating a delay of an impulse response based on the adaptation of the first filter;

delaying a signal based on the estimated delay; and

adapting a second adaptive filter in the time domain based on the delayed signal.

2. (Cancelled)

3. (Previously Presented) The method of claim 1, wherein transforming the signal comprises transforming the signal with a partial Haar transform.

4. (Original) The method of claim 3, wherein the partial Haar transform comprises a subset of basis vectors that span a full time range.

5. (Original) The method of claim 1, wherein estimating the delay comprises identifying one or more adapted coefficients of the first adaptive filter having extreme values relative to the other coefficients of the filter.

6. (Original) The method of claim 5, wherein estimating the delay comprises identifying an adapted coefficient having the largest absolute value.

7. (Previously Presented) The method of claim 1, wherein estimating the delay comprises transforming the estimate of the delay from the transform domain to the time domain.

8. (Original) The method of claim 1, further comprising reducing an echo based on the adaptation of the second adaptive filter.

9. (Previously Presented) An article comprising:

a storage medium having stored thereon data representing sequences of instructions that if executed cause an apparatus to:

transform a signal from a time domain to a transform domain with a wavelet transform;

adapt a first adaptive filter in the transform domain based on the transformed signal;

estimate a delay of an impulse response based on the adaptation of the first filter;

adapt a second adaptive filter in the time domain based on a signal that has been delayed based on the estimated delay.

10. (Cancelled)

11. (Original) The article of claim 9, wherein the instructions to transform further comprise instructions that if executed cause the apparatus to:

transform the signal with a partial Haar transform.

12. (Original) The article of claim 11, wherein the partial Haar transform comprises a subset of basis vectors that span a full time range.

13. (Original) The article of claim 9, wherein the instructions to estimate the delay further comprise instructions that if executed cause the apparatus to:

identify an adapted coefficient of the first adaptive filter having the largest absolute value.

14. (Previously Presented) The article of claim 9, wherein the instructions to estimate the delay further comprise instructions that if executed cause the apparatus to:

transform the estimate of the delay from the transform domain to the time domain.

15. (Original) The article of claim 9, wherein the instructions further comprise instructions that if executed cause the apparatus to:

reduce an echo based on the adaptation of the second adaptive filter.

16. (Previously Presented) An apparatus comprising:

a signal transformer to transform a signal in a time domain to a transformed signal in a transform domain;

a first adaptive filter in communication with the signal transformer, the first adaptive filter to adapt based on the transformed signal in the transform domain;

a delay estimator in communication with the first adaptive filter, the delay estimator to estimate a delay associated with an impulse response based on the adaptation of the first adaptive filter;

a delayer in communication with the delay estimator, the delayer to delay a signal in the time domain based on the estimate of the delay; and

a second adaptive filter in communication with the delayer, the second adaptive filter to adapt in the time domain based on the delayed signal.

17. (Original) The apparatus of claim 16, wherein the signal transformer comprises a wavelet transformer.

18. (Original) The apparatus of claim 17, wherein the signal transformer comprises a partial Haar transformer.

19. (Original) The apparatus of claim 18, wherein the partial Haar transformer comprises a subset of basis vectors that span a full time range.

20. (Original) The apparatus of claim 16, wherein the delay estimator comprises a delay estimator to identify an adapted coefficient of the first adaptive filter having the largest absolute value.

21. (Original) The apparatus of claim 16, wherein the delayer comprises a delayer that is selected from the group consisting of a buffer and a delay line.

22. (Previously Presented) The apparatus of claim 16, wherein the first adaptive filter has 256 or fewer coefficients, and wherein a number of coefficients of the second adaptive filter is based on a longest expected impulse response for the channel.

23. (Original) The apparatus of claim 16, wherein the delayer comprises a delayer to delay the input signal so that the second adaptive filter is substantially centered about the estimate of the delay.

24. (Original) The apparatus of claim 16, implemented in a network device including a switch fabric.

25. (Original) The apparatus of claim 16, implemented in a network device including a DRAM memory.

26. (Previously Presented) An apparatus comprising:

a DRAM memory; and

an echo canceller, the echo canceller including:

a signal transformer to transform a signal in a time domain to a transformed signal in a transform domain;

a first adaptive filter in communication with the signal transformer, the first adaptive filter to adapt based on the transformed signal in the transform domain;

a delay estimator in communication with the first adaptive filter, the delay estimator to estimate a delay associated with an impulse response based on the adaptation of the first adaptive filter;

a delayer in communication with the delay estimator, the delayer to delay a signal in the time domain based on the estimate of the delay; and

a second adaptive filter in communication with the delayer, the second adaptive filter to adapt in the time domain based on the delayed signal.

27. (Original) The apparatus of claim 26, wherein the signal transformer comprises a partial Haar transformer.

28. (Original) The apparatus of claim 26, wherein the delay estimator comprises a delay estimator to identify one or more adapted coefficients of the first adaptive filter having extreme values relative to the other coefficients of the filter.

29. (Original) The apparatus of claim 26, further comprising a switch fabric.

IX. EVIDENCE APPENDIX (37 C.F.R. § 41.37(c)(1)(ix))

To the best of Appellant's knowledge, there is no evidence that is relied upon by Appellants in this appeal to be included in this section.

X. RELATED PROCEEDINGS APPENDIX (37 C.F.R. § 41.37(c)(1)(x))

(To the best of Appellant's knowledge, there are no related appeals or interferences.)